Note to reader: This narrative consists of rearranged Chapter 3 text from 9/30/03 Stakeholder Briefing Draft.

Extreme and Prolonged Drought Events

Much of the year, California is under the influence of a high pressure area, which accounts for fair weather and lack of precipitation during summer. During the winter, the storm belt shifts southward and occasionally places the State under the influence of Pacific storms, which bring vitally needed rain and snow. Planners take into account the normal fluctuations of wet and dry years in allocating deliveries from reservoirs. The flow record available for California is rather short for determining hydrologic risks, extending back only about 100 years with mostly qualitative information perhaps for another 100 years. Hydrology of the past century may not be a reasonable measure of the climate in Northern California. In planning for an uncertain future, water managers should not only plan for normal fluctuations of wet and dry years, but take into account the possibilities of extreme hydrological events such as floods and prolonged droughts. Climate change as it may affect current hydrology is discussed in a later section.

The state's historical record of measured runoff amounts to little more than 100 years of data. Out of this recorded history the 1976-1977 drought was the most severe though it lasted only two years. Two consecutive years with little precipitation (4th driest and the driest year in the recorded history) left California with record low storage in its surface reservoirs and groundwater levels dangerously lowered. Socio economic and environmental impacts were very severe during these extreme drought conditions. The total loss due to the drought during these two years exceeded $ 2.5 billion.

Droughts exceeding three years are relatively rare in Northern California. Table X compares the two historically recorded prolonged droughts (1929-34, 1987-92) with the most severe drought of 1976-77. The 1987-92 drought was notable for its 6 year duration and the statewide nature of its impacts. Because of California's size droughts may not occur simultaneously throughout the state. The Sacramento Valley and San Joaquin Valley river indices developed by the SWRCB, reflect that the Sacramento River System experienced two dry years and four critically dry years while the San Joaquin River System experienced six critically dry years. Water users served by CVP and SWP did not begin to experience shortages until the fourth year of the drought. By the third year of the drought, reservoir storage was about 40 percent below the average, and the groundwater storage declined substantially in some areas. In San Joaquin Valley, during the first five years of the drought, groundwater extractions exceeded the recharge by 11 million acre-feet which caused increased land subsidence in some areas.

Footnote: For a complete evaluation of the 1976/1977 drought please refer to the May 1978 document by the Department of Water Resources titled " The 1976-1977 California Drought , A Review"

Southern California was spared from severe rationing during most of the 1987-92 drought primarily because of the 600,000 acre-feet annually of surplus Colorado River water made available to the Metropolitan Water District of Southern California. Even with this supply, however, much of Southern California experienced significant rationing in 1991. Supplemental Colorado River water cannot be counted on to meet needs in the

future as Arizona and Nevada continue to use their full Colorado River allocations and California must live within its basic apportionment of river water.

Drought Period	Sacramento Valley Runoff		San Joaquin valley Runoff	
	maf/yr	(% average)	maf/yr	(% average)
1929-34	9.8	55	3.3	57
1976-77	6.6	37	1.5	26
1987-92	10.0	56	2.8	47

The 1987-92 drought helped to identify shortcomings in management strategies implemented through the experiences from the 1976-77 drought. The economic and environmental impact due to this drought caused a heavy burden throughout the state. DWR studies indicate that in 1990-92, the drought resulted in reduced gross revenues of about $670 million to California agriculture. Energy utilities were forced to substitute more costly fossil-fuel generation at an estimated statewide cost of $500 million in 1991. The drought also adversely affected snow-related recreation businesses. Some studies suggest as much as an $85-million loss for snow-related recreation businesses during the winter of 1990-91.

DWR surveyed over 60 urban water districts, chambers of commerce, trade groups, and industry associations throughout California regarding droughts to assess the effect of the 1987-92 drought upon the commercial and industrial sectors. Survey responses indicated that only one major industry group, the "green industry" (landscape and gardening industry), was significantly affected by the drought. The green industry lost about $460 million in gross revenues and 5,600 full-time jobs during 1991. Green industry firms contributed an estimated $7 billion toward the state's economy in 1990 and employed about 125,000 full-time workers. (Bulletin 160-93)

Drought Contingency Planning

In response to substantial public interest created by dry weather conditions through January 2000, DWR evaluated water supply conditions, changed circumstances since the last drought, and other factors that would affect drought readiness in 2001. In its July 2000 report, “Preparing for California’s Next Drought”, the Department reviewed items for near-term drought planning, putting California’s conditions today into perspective with experiences gained in the 1987-92 drought.

Major findings of the report focused on the characterization of drought conditions as a gradual phenomenon and as a function of impacts on water users. The report also addressed the vulnerability of existing water users based on past droughts, and a discussion of current actions that affect drought preparedness planning.

On June 9, 2000, Governor Davis and Interior Secretary Babbitt announced a "Framework of Action" as the completion of a five year planning program to implement specific actions of the CALFED Bay-Delta Program. The Framework included a recommendation that Governor Davis appoint a panel to develop a Drought Contingency Plan by the end of the year 2000. The July 2000 drought report was used to brief the panel on current drought actions and findings. The December 2000 report, "The Critical Water Shortages Contingency Plan", describes the panel members' recommendations for actions that the State government could take to reduce the impacts of critical water shortages. Summary of the recommendations are listed below. The work on these programs started early 2002 and is still ongoing.

Recommendations

- **Critical Water Shortage Reduction Marketing Program:** In addition to the commitment of CALFED agencies to provide water transfers data online and to streamline the processes that buyers and sellers must work through to implement certain types of water transfers such as intra regional, short term, and dry year transfers, the Panel recommends that DWR implement a critical water shortage reduction water program. DWR would acquire options to purchase water from willing sellers and would exercise the options as needed to make available for sale to water users experiencing critical water shortages. The purchaser should demonstrate that they have made a responsible effort to use their water supply efficiently and that it has taken steps to prepare for critical water shortages; but, the shortage it now faces goes beyond its local response capacity. It is recommended that priority of water allocations should favor those having the greatest needs while recognizing the special problems experienced by smaller agencies having the least ability to negotiate their own water purchasing and conveyance agreements. Panel's recommendations do not restrict the ability of a local agency or a private entity to operate its own water acquisition program. Any purchasing program should coordinate with the existing water purchasing programs in the State and federal levels such as CVPIA, EWA and other CALFED programs.

- **Assistance to Small Water Systems and Homeowners in Rural Counties:** Past droughts have demonstrated that the water users affected the earliest and to the greatest extent by dry conditions are small water systems and individuals relying on marginal ground water sources. These small water users bore the brunt of actual public health and safety impacts due to lack of water for basic sanitation and firefighting. Geographic areas especially affected included the Sierra Nevada foothills, Coast Range foothills, and North and Central Coast areas, locations where hydro-geologic conditions often result in limited availability of usable groundwater. Funding education programs targeted at rural homeowners and small domestic water systems which rely on self-supplied groundwater is recommended as well as providing technical assistance in proper

well construction and maintenance. Providing information about state and county well construction requirements through a website is also recommended.

- **Local Agency Groundwater Programs:** The drought panel recognizes that the CALFED ROD commits CALFED agencies to fund and facilitate locally controlled groundwater projects that would provide 500-1000 taf of additional storage capacity by 2007. Substantial funding for developing local groundwater recharge and storage programs is provided in Proposition 13 and through the CALFED's Integrated Storage Investigation Program. However, additional federal funding will be critical to the success of this program.

  Groundwater hydrologic data in California lags behind that of surface water data, in part because of the inherent nature of the resource and to the absence of a statewide system of permitting and reporting groundwater extractions. Additional funding is requested to provide for ongoing statewide groundwater data collection and compilation. The water quality component of data collection and compilation should be expanded to a level of effort comparable to that used for water levels data. The program should encompass actual field collection of geo-hydrologic data, including installation of monitoring wells in locations where data gaps exist.

- **Local Agency Integrated Water Management Plans**
  DWR and other CALFED agencies should work in partnership with local water agencies to assist them in developing plans to facilitate integrated management of supplies for agricultural, urban, and environmental purposes. Ensuring optimum use of water in a local area improves the areas' ability to manage shortages and helps foster cooperative regional approaches to shortage management. Historically, cost has been a barrier to performing integrated water resources planning for small urban water agencies and many agricultural water agencies. To help these agencies help themselves, the drought panel believes that it is appropriate to provide financial assistance to encourage planning that optimizes use of local and regional resources.

- **Drought –Related Research and Public Outreach Activities:** California can be subject to prolonged and severe droughts any time. Research and public outreach activities can help California prepare for the inevitable future drought. The drought panel recommends that DWR should identify and seek funding for research areas of long-range weather forecasting, global climate change, and paleoclimatology. Improved long-term weather forecasting capabilities would help in optimizing the operation of State, federal and local water projects. Quantifying the hydrologic conditions beyond the historical records could be possible with advanced paleoclimate research.

The panel also recommends that DWR should compile existing local agency drought watch indices and develop regional hydrologic drought indices. These indices would be a resource for water managers to use in developing criteria for establishing drought watches in their jurisdiction, and should form the basis for coordinated statewide monitoring effort.

- **Accelerated Proposition 13 Financial Assistance to Local Agencies:** Proposition 13, the $1.97 billion measure enacted by the voters in March 2000, created or provided additional funding for 28 major programs, many of which directly support or complement CALFED implementation. Most of the measure's programs are competitive loans and grant programs, the majority administered by DWR or SWRCB. Actions necessary to put these programs in place can be time consuming, hence rapid disbursement of bond monies and obtaining sufficient appropriations for pending fiscal years are key.